

What is claimed is:

1. A gas injection apparatus for injecting a reactive gas into a reaction chamber of a semiconductor processing system, the apparatus comprising:

an injector disposed to contact an inner surface of a wall of the reaction chamber, the injector having a plurality of nozzles penetrating it, through which the reactive gas is injected into the reaction chamber;

a gas inlet penetrating through the wall of the reaction chamber;

a manifold disposed between the wall of the reaction chamber and the injector, for supplying the reactive gas flowing through the gas inlet to each of the plurality of nozzles; and

gas channels arranged on at least two levels in the manifold, the at least two levels equalizing lengths of gas paths connecting the gas inlet to the plurality of nozzles.

2. The gas injection apparatus as claimed in claim 1, wherein one level of the gas channels of the at least two levels of gas channels is split into two branches at either end of the next higher level of the gas channel, each branch having the same length, the highest level of gas channel is split into two branches, each having the same length at a portion connecting with the gas inlet, and each of the plurality of nozzles is connected to the lowest level of the gas channels.

3. The gas injection apparatus as claimed in claim 2, wherein the gas channels are arranged on four levels.

4. The gas injection apparatus as claimed in claim 2, wherein each of the plurality of nozzles is connected at either end of the lowest level of the gas channels.

5. The gas injection apparatus as claimed in claim 1, wherein a support structure is formed in the inner surface of the wall of the reaction chamber, and the injector is inserted into the support structure.

6. The gas injection apparatus as claimed in claim 1, wherein the gas channels are formed in the shape of a groove on the surface of the injector in contact with the inner surface of the wall of the reaction chamber.

7. The gas injection apparatus as claimed in claim 1, wherein the gas channels are formed in the shape of a groove on the inner surface of the wall of the reaction chamber.

8. The gas injection apparatus as claimed in claim 7, wherein the injector is formed of a dielectric liner.

9. The gas injection apparatus as claimed in claim 8, wherein the dielectric liner is formed of a ceramic material.

10. The gas injection apparatus as claimed in claim 1, wherein exits of the plurality of nozzles are evenly spaced on a surface of the injector opposite to an interior of the reaction chamber, along a circumference of the injector.

11. The gas injection apparatus as claimed in claim 1, wherein the injector is flat and ring-shaped and disposed to contact the bottom of an upper wall of the reaction chamber.

12. The gas injection apparatus as claimed in claim 11, wherein the gas channels are disposed so that a high-level gas channel relative to the gas inlet is closer to an outer circumference of the injector and a low-level gas channel relative to the gas inlet is closer to an inner circumference of the injector.

13. The gas injection apparatus as claimed in claim 1, wherein the injector is cylindrical and disposed to contact an inner surface of a sidewall of the reaction chamber.

14. The gas injection apparatus as claimed in claim 12, wherein the gas channels are disposed on the outer circumference of the injector so that a high-level gas channel relative to the gas inlet is lower in the reaction chamber than a low-level gas channel relative to the gas inlet.

15. The gas injection apparatus as claimed in claim 1, wherein the injector is conical and disposed to contact a sloped inner surface of an upper wall of the reaction chamber.

16. The gas injection apparatus as claimed in claim 15, wherein the gas channels are disposed on the outer circumference of the injector so that a high-level gas channel relative to the gas inlet is located lower in the reaction chamber than a low-level gas channel relative to the gas inlet.

17. The gas injection apparatus as claimed in claim 14, wherein the injector is supported by a support member in the wall of the reaction chamber.

18. The gas injection apparatus as claimed in claim 1, further comprising a showerhead type injector disposed at the top of the reaction chamber, the showerhead type injector supplying the reactive gas towards a center of the reaction chamber.

19. The gas injection apparatus as claimed in claim 1, wherein two or more reactive gases are mixed when passing through the manifold, and a mixture of the two or more reactive gases are injected into the reaction chamber through the plurality of nozzles.

20. The gas injection apparatus as claimed in claim 1, wherein the reaction chamber includes a plasma source or magnetron gun.